

REMARKS

Claims 1-24 are currently pending in the subject patent application.

In the Office Action dated October 03, 2006, the Examiner rejected claims 1-4, 6-12, 14-20, and 22-24 under 35 U.S.C. 103(a) as being unpatentable over Rezaul Islam et al. (U.S. Patent No. 6,282,670) in view of Burns et al. (U.S. Patent No. 6,088,694) and further in view of Hesselink et al. (U.S. Publication No. 200510149481), since the Examiner stated that as per claim 1, Rezaul Islam et al. discloses a method for recovering data in a redundant data storage system having a plurality of data storage units, said method comprising: storing said data on said plurality of data storage units according to a redundant data storage method (Col. 2, lines 18-29); removing one of said plurality of data storage units (Col. 4, lines 33-42); while said one of said plurality of data storage units is removed, changing a portion of said data on the remainder of said plurality of data storage units and (Col. 4, lines 36-43); replacing said one of said plurality of data storage units (Col. 1, line 66 to Col. 2, line 6); and updating said one of said plurality of data storage units (Col. 2, lines 18-27). The Examiner continued that Rezaul Islam et al. does not specifically teach storing a record of said changes in a delta file and updating those portions of data recorded in said delta file as required by the claim, but that Burns discloses storing a record of changes in a delta file and updating portions of data recorded in the delta file (Col. 5, line 61 to Col. 6, line 51) in order to achieve efficient and cost effective backup of data (Col. 6, lines 3-5).

The Examiner concluded that since the technology for implementing a storage recovery system with storing a record of changes in a delta file and updating portions of data recorded in the delta file was well known as evidenced by Burns, an artisan would have been motivated to implement this feature in the system of Rezaul in order to achieve efficient and cost effective backup of data, and that it would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the system of Rezaul Islam et al. to include storing a record of changes in a delta file and updating portions of data recorded in the delta file because this would have achieved efficient and cost effective backup of data (Col. 6, lines 3-5) as taught by Burns.

The Examiner continued by stating that Rezaul Islam et al. and Burns et al. do not specifically teach starting a delta log concurrently with said step of removing one of said plurality of data storage units as required, but that Hesselink et al. discloses starting a delta log concurrently with said step of removing one of said plurality of data storage units (Paragraph [166], ll. 9-20) to allow the storage unit to later obtain changes that were made during the offline period (Paragraph [166], ll. 15-19), and that since the technology for implementing a storage recovery system with starting a delta log concurrently with said step of removing one of said plurality of data storage units was well known as evidenced by Hesselink et al., an artisan would have been motivated to implement this feature in the system of Rezaul Islam et al. and Burns et al. since this would have allowed the storage unit to later obtain changes that were made during the offline period. The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the system of Rezaul Islam et al. and Burns et al. to include starting a delta log concurrently with said step of removing one of said plurality of data storage units because this would have allowed the storage unit to later obtain changes that were made during the offline period (Paragraph [166], ll. 15-19) as taught by Hesselink et al.

As per claims 9 and 17, the rationale in the rejection of claim 1 was incorporated by the Examiner. The Examiner continued that Rezaul Islam et al. further discloses a redundant data storage system capable of fast restoration of serviced data storage units comprising: a plurality of data storage units (Col. 4, lines 33-44); and a controller that stores data on said plurality of data storage units according to a redundant data storage method, changes a portion of said data after taking one of said plurality of said data storage units off line, stores a record of the changes in a delta log that are made to the remainder of the plurality of said data storage units, brings said one of said plurality of said data storage units online, and updates said one of said plurality of said data storage units by updating those portions of data recorded in said delta file (Fig. 1, controller 120; and Col. 17, lines 46-60) (emphasis added by applicants).

Applicants respectfully disagree with the rejection of claims 1, 9 and 17 under 35

U.S.C. 103(a) as being unpatentable over Rezaul Islam et al. (U.S. Patent No. 6,282,670) in view of Burns et al. (U.S. Patent No. 6,088,694) and further in view of Hesselink et al. (U.S. Publication No. 200510149481), for the reasons to be set forth hereinbelow. The Examiner also rejected dependent claims 2-4, 6-8, 10-12, 14-16, 18-20, and 22-24 under 35 U.S.C. 103(a) as being unpatentable over Rezaul Islam et al. (U.S. Patent No. 6,282,670) in view of Burns et al. (U.S. Patent No. 6,088,694) and further in view of Hesselink et al. (U.S. Publication No. 200510149481). However, since applicants believe that claims 1, 9 and 17 are patentable over these references, and claims 2-4, 6-8, 10-12, 14-16, 18-20, and 22-24 are dependent therefrom, applicants believe that no further response is required for the rejection of the dependent claims.

Claims 5, 13, and 21 were rejected under 35 U.S.C. 103(a) as being unpatentable over Rezaul Islam et al. (U.S. Patent No. 6,282,670) in view of Burns et al. (U.S. Patent No. 6,088,694), Hesselink et al. (U.S. Publication No. 2005/0149481) as applied to claims 1, 9, and 17 respectively, and further in view of McCabe et al. (U.S. Publication No. 2002/1001 6827), since the Examiner stated that as per claims 5, 13 and 21, McCabe discloses that the redundant data storage method comprises remotely mirroring the data (Fig. 3; Paragraph [0201]) in order to provide better fault tolerance and/or disaster recovery (Paragraph [0002]), and that since the technology for implementing a storage recovery system with remote mirroring was well known as evidenced by McCabe, an artisan would have been motivated to implement this feature in the system of Rezaul Islam et al., Burns et al. and Hesselink et al. in order to provide better fault tolerance and/or disaster recovery. The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of invention by Applicant to modify the system of Rezaul Islam et al., Burns et al. and Hesselink et al. to include remote mirroring because this would have provided better fault tolerance and/or disaster recovery (Paragraph [0002]) as taught by McCabe.

Applicants respectfully disagree with the Examiner's rejection of claims 5, 13, and 21 under 35 U.S.C. 103(a) as being unpatentable over Rezaul Islam et al. (U.S. Patent No. 6,282,670) in view of Burns et al. (U.S. Patent No. 6,088,694), Hesselink et al. (U.S. Publication No. 2005/0149481) as applied to claims 1, 9, and 17 respectively,

and further in view of McCabe et al. (U.S. Publication No. 2002/1001 6827), since, for the reasons to be set forth hereinbelow, applicants believe that the Examiner has improperly combined Rezaul Islam et al. with Burns et al. Therefore, the combination of Rezaul Islam et al. and Burns et al. with Hesselink et al. and McCabe et al. is similarly improper.

The Examiner made Lu (U.S. Patent No. 6,952,794) and Gold et al. (U.S. Patent No. 6,785,786) of record as being pertinent to applicant's disclosure, but has not applied these references to the subject claims. Applicants therefore do not believe that any further comment with regard to these references is required.

Turning now to the rejection of claims 1-4, 6-12, 14-20, and 22-24 under 35 U.S.C. 103(a) as being unpatentable over Rezaul Islam et al. (U.S. Patent No. 6,282,670) in view of Burns et al. (U.S. Patent No. 6,088,694) and further in view of Hesselink et al. (U.S. Publication No. 2005/10149481), applicants wish to direct the Examiner's attention to Col. 4, lines 21-46, of Burns et al. wherein it is stated that "The present invention provides a computer system that permits continuous availability of a file that is stored in a file management system and linked or referenced by a database management system (DBMS) through a DATALINK data type, even while the file is being modified at the file management system with either the append or update operation. Applications gain access to a linked file name through the DBMS, access file data through local file systems, and make modifications to that data. During this modification, other applications or users can access the immediately previous version of the file which is registered in the DBMS. When a modifying application finishes writing file data on the local file system, it closes its write access and transactionally updates the Datalink reference to the linked file, to reference the changed file data." In Col 5, line 25, to Col. 6, line 5, Burns et al. continue that: "The invention can be applied to the operation of updating a linked file A1, which was described above. In accordance with the invention, the procedure could be changed as follows: (a) Make a copy of file A1 using the filesystem services. Let the copy of the file be called A2. (b) Modify A2. Note that file A1 remains linked while the user modifies A2 and is available for the DBMS queries. (c) Make new metadata based on the content of A2. (d) Update the row which

referenced file A1 in the database with the metadata and reference to A2. The update processing in the DBMS involves the following. File A1 is "unlinked" and A2 is "linked" as part of the same transaction. Furthermore, as part of link processing of A2, backup for file A2 is initiated. To provide database consistency, integrity and recoverability guarantees, the linked version of the file must be able to be recalled from a backup server. Consider that the file system fails and the contents of a linked file are lost. The DATALINK value in the database is now inconsistent and the file contents, as they were at link time must be restored. Alternatively, consider that the database experiences system failure and has to be recovered to a previous image of the database. A Datalink column in the previous versions may link what is now an out of date file. To make the restored database consistent, the Data Linker must restore the old version of the file. For DBMSs that link and unlink files frequently, a large number of file backups will be performed by the DataLinker. For each backup, the number of bytes in the linked file will be sent to the backup server. This cost may become prohibitive. Consequently, there is also a need for an efficient backup mechanism to reduce the amount of information sent to a backup server in association with keeping file data and Datalink data type columns consistent and recoverable. The efficient backup involves that only the modified portions of a "versioned" file be backed up. In our example above, the reference file A1 is referred to as a "versioned" file. Assume file A1 is backed up in total. However, the backup operation of the new version of file A2 would involve backing up only the modified portions with respect to A1. The file changes from a prior version define what is called a delta file. This delta file compactly represents A2 as a set of changes to A1. By backing up this delta file instead of backing up the whole file A2, a computer system may reduce the cost of backup for frequently versioned data files." (emphasis added by applicants).

Applicants wish to point out that the present claimed invention does not create a delta file by comparing two existing, already stored, files and identifying the modified portions for a backed up file, as suggested by Burns et al. Rather, the delta file of the present invention is recited as: "... storing a record of said changes in said delta log;" (please see claim 1, hereof).

Further, Burns et al. requires that A1 remain linked while the user modifies A2, A1 being available for the DBMS queries, while Rezaul Islam et al., by contrast, requires that the system has means for identifying a failed storage device and for **removing** the failed storage device from the RAID system. Rezaul Islam et al. in Col. 11, line 55 to Col. 12, line 20 states that: "Media errors on a physical drive can occur that result in the device not being able to supply the requested data for a stripe unit. If a media error occurs during a logical drive rebuild, then the data on the stripe cannot be reconstructed. For example, if a media error occurred while reading a strip unit on a first disk, then the corresponding (from the same stripe) stripe unit from the second disk could not be reconstructed. If this error is ignored, the next time the user accesses data in the stripe unit of the second disk, incorrect data will be supplied since it was not reconstructed correctly. To avoid this problem, some RAID controllers report the device with the media errors as a dead device. When this occurs, the entire logical drive will go off line since the data can no longer be reconstructed (at this point there are 2 stripe units with unknown data). When a logical drive is off line, the user cannot access any data on that logical drive and all data on that logical drive is considered to have been lost. To bring the logical drive back online, the user must replace the device that has the media error, and restore the lost data. To overcome this problem, this invention uses a table located in the adapter's NVRAM to keep track of stripes that could not be reconstructed successfully. If a stripe could not be reconstructed successfully during a logical drive rebuild operation, an entry is made in a "bad stripe table" containing the logical drive and the stripe number that could not be rebuilt successfully. When the user tries to access data, this table is checked. If there is an entry in the bad stripe table for a stripe being accessed, the user will receive an error message. Although the user may lose a small portion of the data, the user is only presented with an error message instead of incorrect data."

In the second paragraph of the Examiner's Response to Arguments, the Examiner stated that: "Examiner is perplexed about applicants' reason(s) why Burns has improperly been combined with Rezaul. Applicants appear to argue that Burns has

not properly been combined with Rezaul since in the system of Burns file A1 is not taken offline when A2 is being updated while the system of Rezaul requires that the failed storage device be removed from the RAID system. However, Examiner would like to mention that the reason why A1 remains linked while A2 is being modified is to avoid having the same problem found in the system of Rezaul (when a drive is off line, the user cannot access any data on that drive and that data is considered to have been lost; (Col. 4, II. 25-30)). Burns cures that deficiency by having A1 remaining on line while modifying A2 thereby making data files continuously available to all users (Abstract)."

Applicants respectfully disagree with the Examiner. The defective **drives** of Rezaul Islam et al. are taken off line since they are defective. The **files** of Burns et al. being updated are **not** located on defective drives. Therefore, applicants fail to understand how Burns et al. cures a problem for Rezaul Islam et al. Why would a user wish to access a defective drive? Moreover, in the Examiner's comments regarding claims 9 and 17 set forth hereinabove, the Examiner stated that "**Rezaul further discloses a redundant data storage system capable of fast restoration of serviced data storage units** comprising:" If the Examiner is correct in the assertion that Rezaul Islam et al. restores serviced data storage units rapidly, what would be the motivation of using a delta file, when the RAID system is required to gather only a small amount of data before the restored unit is placed again on line?

The Examiner has stated that Hesselink et al. discloses starting a delta log concurrently with said step of removing one of said plurality of data storage units (Paragraph [166], II. 9-20) to allow the storage unit to later obtain changes that were made during the offline period (Paragraph [166], II. 15-19). The word "concurrent" means happening at the same time as something else. Paragraph [166] of Hesselink et al. does not suggest or imply such a requirement. In lines 6-9 of paragraph [166] it is stated that: "For example, a user may take computer **72** on an airplane and continue to edit 'my documents.doc' even though she or he does not have any network connection available." Generally, laptop computers are placed in the off condition while going to and from airports. Applicants therefore, fail to understand in what manner the Examiner

is using the Hesselink et al. reference in combination with Rezaul Islam et al. and Burns et al.

Thus, applicants continue to misunderstand the Examiner's conclusory statement that since the technology for implementing a storage recovery system with storing a record of changes in a delta file and updating portions of data recorded in the delta file is well known as evidenced by Burns et al., an artisan would have been motivated to implement this feature in the system of Rezaul et al. in order to achieve efficient and cost effective backup of data. Clearly, Rezaul et al. does not require or teach this additional feature to achieve its goal of managing **defective** media in a RAID system.

The Federal Circuit ruled in *In re Kahn* (Fed. Cir. No. 04-1616, March 22, 2006), that a Board of Patent Appeals and Interferences must articulate the motivation, suggestion or teaching that would have led the skilled artisan at the time of the invention to combine prior art elements to make the claimed invention. To establish a *prima facie* case of obviousness based on a combination of prior art elements, "the Board must articulate the basis on which it concludes that it would have been obvious to make the claimed invention, When the Board does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed invention as a whole, we infer that the Board used hindsight to conclude that the invention was obvious." The Examiner has merely stated that since the technology for implementing a storage recovery system with storing a record of changes in a delta file and updating portions of data recorded in the delta file is well known as evidenced by Burns et al., an artisan would have been motivated to implement this feature in the system of Rezaul et al. in order to achieve efficient and cost effective backup of data, and therefore, it would have been obvious to one of ordinary skill in the art at the time of invention by applicants to modify the system of Rezaul et al. to include storing a record of changes in a delta file and updating portions of data recorded in the delta file because this would have achieved efficient and cost effective backup of data as taught by Burns et al.

Applicants respectfully believe that this bare statement by the Examiner does not rise to a motivation, suggestion or teaching as required by the court in *In re Kahn*. Rather, applicants believe that the Examiner is using hindsight to construct the present claimed invention.

Applicants therefore respectfully believe that the Examiner has failed to make a proper *prima facie* argument for obviousness as is required in a rejection under 35 U.S.C. 103(a), since there would be no motivation to combine Rezaul et al. with Burns et al.

In view of the discussion presented hereinabove, applicants believe that subject claims 1-24 are in condition for allowance or appeal, the former action by the Examiner at an early being earnestly solicited.

Reexamination and reconsideration are respectfully requested.

Respectfully submitted,

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